REMARKS

Applicants respectfully request that the above application be reconsidered, as amended, in view of the following remarks. Claims 17-30 and 32-38 are currently pending.

Applicants kindly acknowledge the statement at page 7 of the Office Action that the Examiner has initialed the SB/08 form attached to the Supplemental Information Disclosure Statement concurrently filed with the Request for Continued Examination citing U.S. Patent 6,677,054 (Subramanian).

Claims 17 and 32 have been amended with regard to the step (3) which recites that the infiltrated alumina precursor is converted in situ to alumina within the porous outer layer. Support for this amendment can be found in paragraph [0032] at page 13 and paragraph [0034] at page 14 of the above application.

A. Response to Rejection of Claims 17-25, 27-30, 32-35 and 37 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al., in View of Hasz et al.

At page 8 of the Office Action (see section 4), Claims 17-25, 27-30, 32-35 and 37 have again been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,324,544 (Spence et al.), in view of U.S. Patent 5,871,820 (Hasz et al.). Briefly, Spence et al. discloses a method for protecting fuel contacting surfaces of a metallic substrate for a gas turbine engine component from carbon deposits by applying a coating of alumina and silica to the surfaces from a sol-gel. See abstract. Briefly, Hasz et al. discloses protecting thermal barrier coatings by using an impermeable barrier coating that is a dense non-cracked, non-porous layer. See abstract and column 2, lines 17-31.

Applicants again respectfully traverse this rejection. Contrary to what the Office Action suggests, Spence et al. does not teach or suggest the method of Claims 17-25, 27-30, 32-35 and 37, as amended or as currently presented. In particular, Spence et al. does not teach or suggest infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor according to the claimed method. See step 2 of Claim 17. Instead, Spence et al. teaches coating the fuel contacting surface of a metallic substrate/component with a thin, high temperature resistant layer of alumina and silica deposited from a sol-gel. See column 3, lines 17-22. Nowhere does Spence et al. teach or suggest that the deposited sol-gel infiltrates the fuel

contacting surface of the metallic substrate/component, much less a porous outer layer of a thermal barrier coating as in the claimed method.

In response (see page 2 of the Response to Arguments section), the Office Action alleges that "infiltrating" is defined by "Webster's online dictionary" as "to cause to permeate something" and that "impregnating" is defined by "Webster's online dictionary" as "to cause to be permeated." Unfortunately, and in violation of 37 CFR 1.104(c)(2), the Office Action has failed to provide Applicants either with a copy of the alleged definitions from "Webster's online dictionary" or where Applicants might obtain such definitions on the Internet because the designation "Webster's online dictionary" does not adequately provide sufficient information to obtain these definitions. Until either copies of these definitions are provided to Applicants or until Applicants are provided with sufficient information as to where these definitions from "Webster's online dictionary" can be obtained, Applicants has no way of verifying whether these definitions are correct or are the only definitions provided by "Webster's online dictionary" for the two indicated terms.

In further response, the Office Action alleges that "infiltrating" is synonymous with "impregnating." The Office Action then relies on the case of *In re Marra*, 141 USPQ 221 for the position that "the art does not recognize any distinction between coating and impregnating." The Office Action thus appears to suggest, by some strained logic, that there is no art recognized distinction between "coating" and "infiltrating."

Even assuming that the definitions provided by the Office Action are correct for the two indicated terms, the Examiner's position that there is no art recognized distinction between "coating" and "infiltrating" with regard to the method of Claims 17-25 and 27-31 is unsupportable in view of the art relied on (i.e., Spence et al and Hasz et al). The Examiner's position is certainly not supported by the case of *In re Marra*. The case of *In re Marra* involved a rejection of a claimed process for sizing paper by applying a coating composition comprising a ketene dimer to a cellulose paper web. One of the references (Keim et al.) relied on in this rejection taught the use of the claimed ketene dimer in sizing paper.

The Examiner's attention is also directed to the following relevant paragraph from pages 223-224 of *In re Marra* case:

> We have difficulty accepting the distinction urged by appellants that "coating" differs from "impregnating" in this case. It would appear that a porous material like paper would be impregnated to some extent by an aqueous composition applied "by various coating techniques" as Keim et al. suggests, whether the composition is called "coating" or "impregnating." It seems doubtful that a clearly defined interface between the paper and the coating would result. The differences between coating compositions and impregnating compositions, according to appellants, are in dilution and viscosity. That is, a "coating composition usually has a high-solids content and a relatively high viscosity." It is clear that none of the claims have any limitations on dilution (solids content) or viscosity. The method claim merely recites "applying" the composition which would appear to include both "coating" and "impregnating," and there is no evidence that the art recognizes a distinction. Accordingly, we see not justification for concluding that it is unobvious to employ a sizing agent in either a "coating" composition or an "impregnating" composition. (Emphasis added.)

As the above quoted paragraph from the *In re Marra* case demonstrates, the material (i.e., paper) on which the "coating composition" was to be applied was itself porous, and therefore the "coating composition" would inherently "impregnate" this porous material. Accordingly, the Examiner is citing the *In re Marra* case completely out of context, and to improperly justify the strained and unsupportable logic that "coating" and "infiltrating" are somehow art recognized equivalents with regard to the method of Claims 17-25, 27-30, 32-35 and 37.

The Response to Arguments section (see paragraph bridging pages 2-3 of the Office Action) again alleges that it would be obvious to modify Spence et al. "to use a protective coating on a thermal barrier coating as suggested by [Hasz et al.] to provide desirable protection from environmental contaminants because [Spence et al.] teaches applying an alumina /silicon coating protects various substrates, including ceramic, from contaminants and [Hasz et al.] teaches thermal barrier coatings, with outer layers of ceramic, benefit from a contaminant protective coating." The alleged "motivation" for combining these references is essentially as follows (see bottom paragraph at page of the Office Action): (1) Hasz et al. allegedly shows that thermal barrier coatings comprising an alumina barrier layer and a bond coating are susceptible to various modes of damage from contaminants; (2) Hasz et al. allegedly discloses the contaminants as materials that are in the engine which deposit on the surface of the engine part, from air and fuel sources, and impurities to oxidations products and only uses CMAS as an "exemplary showing"; (3) Spence et al. and Hasz et al. are relevant art because they both allegedly teach protecting turbine engine parts from contaminants; and (4) Spence et al. teaches applying an alumina/silicon

coating protects various substrates, including ceramic, from contaminants and Hasz et al. teaches thermal barrier coatings with outer layers of ceramic benefit from a contaminant protective coating

This alleged combination of references is *prima facie* improper because the Office Action has still not provided any proper motivation for combining Hasz et al. with Spence et al. *See, e.g., In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so"); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

Again, Spence et al. and Hasz et al. are not directed at protecting against the same or similar environmental contaminants. As acknowledged by the Office Action, Spence et al. is directed at inhibiting carbon deposits (e.g., coke formation) on metallic substrates (see column 1, lines 11-13, and column 3 lines 9-11). By contrast, Hasz et al. is directed at protecting the coating against infiltration of different environmental contaminants, namely CMAS (see column 1, lines 63-67) and iron oxides (see column 2, lines 32-35). Contrary to what the Office Action suggests, CMAS is not simply "exemplary" but is the primary environmental contaminant (other than iron oxides) that Hasz et al. is directed at protecting against. In addition, Hasz et al makes no reference to protecting against either "carbon deposits" or "coke formation" as in Spence et al. Accordingly, the Office Action has still provided no proper "motivation to combine" the teaching Hasz et al. with those of Spence et al.

Even if properly combinable with Spence et al., Hasz et al. still fails to teach or suggest infiltrating the porous outer layer of a thermal barrier coating with an alumina precursor according to the method of Claims 17-25 and 27-31. Instead, Hasz et al., forms an impermeable barrier coating on the thermal barrier coating, whether it be deposited from a sol-gel or otherwise. Nowhere does Hasz et al. teach or suggest that the deposited sol-gel infiltrates a porous outer layer of the thermal barrier coating as in the claimed method. In fact, nowhere does Hasz et al. teach or suggest that the sol-gel infiltrates the thermal barrier coating as an alumina precursor that is then converted in situ to alumina. See step (3) of amended Claims 17 and 32.

In response (see page 4 of the Response to Arguments section), the Office Action again relies on the strained and unsupportable logic that, because the definitions of "infiltrating" and "impregnating," are allegedly synonymous, "infiltrating" is equivalent to "coating" because there is no art recognized difference between "impregnating" and "coating" in view of *In re Marra*. In addition, the Office Action, while agreeing that Hasz et al. discloses forming an impermeable coating, nonetheless alleges that the thermal barrier coating protected by the Hasz et al. impermeable coating must "necessarily" have some degree of porosity such that this impermeable coating would "infiltrate" the underlying thermal barrier coating. What the Office Action alleges about the "porosity" of the thermal barrier coating is unsupported speculation not taught by Hasz et al. In particular, nothing in Hasz et al. teaches or suggests that the thermal barrier coating would have sufficient porosity to permit infiltration of the impermeable coating. If Examiner wishes to persist in this speculation not supported by the art relied on, Applicants respectfully request that he provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge.

In addition, the benefit of the Hasz et al. impermeable coating appears to be to prevent any flow of contaminants into the underlying thermal barrier coating. By contrast, infiltrating and then converting alumina in situ within the porous outer layer according to the instant Claims provides a reservoir of alumina that can react with the contaminants to form a phase with a higher melting point. This alumina reservoir thus "freezes" the contaminants and does not permit these "frozen" contaminants to further penetrate into the thermal barrier coating, nor go through cyclic liquid-solid-liquid phase transformations that can undesirably stress and crack the thermal barrier coating. Such a benefit for infiltrating alumina within a porous outer layer is not taught at all by Hasz et al., or Spence et al.

Indeed, neither Spence et al., nor Hasz et al., suggest that their respective surface/component or thermal barrier coating are in anyway porous such that the applied coating would inherently infiltrate the surface/component or thermal barrier coating. In fact, Spence et al. and Hasz et al. would suggest just the opposite. Each of these references teach a separate coating layer on top of the respective surface/component or thermal barrier coating. In other words, there is a "clearly defined interface between" the applied coating of Spence et al. and Hasz et al., and the respective surface/component or thermal barrier coating.

In response (see paragraph bridging pages 4-5 of the Response to Arguments section), the Office Action alleges that Applicants rely on a feature (reservoir of alumina to react with the contaminants) that is not recited in the Claims. But what Applicants have pointed out is, in fact, the inherent benefit of having infiltrated alumina within the porous outer layer. In other words, this "reservoir of alumina" is the infiltrated alumina present within the porous outer layer.

With regard to Claims 29-30, the Office Action again concedes that Spence et al., even in view of Hasz et al., fails to teach the claimed period of time for treating the outer layer. In response (see page 5 of Response to Arguments section), the Office Action takes the position that the "length of treatment" is "a result effective variable," and that it would be obvious "to optimize such treatment length to insure proper coating thickness." The Office Action's position is simply unsupportable and improper speculation. The cited case law (*In re Boesch*) regarding selecting "optimum values" is irrelevant because, as even the Office Action concedes, no time periods are taught by the art relied on. Accordingly, there is still no a proper basis for rejecting Claims 29-30 under 35 U.S.C. § 103(a) as unpatentable over Spence et al. in view of Hasz et al. If the Examiner still wishes to persist in this position regarding Claims 29-30 that is not supported by the art relied on, Applicants respectfully renew their previous request that he provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge.

In rejecting Claims 32-35 and 37 as unpatentable over Spence et al., in view of Hasz et al., the current Office Action again violates 37 CFR 1.104(c)(2). The prior August 8, 2005 Office Action never specifically identifies where Spence et al. or Hasz et al., separately or in combination, teach or suggest a turbine component that is in an assembled state when the porous outer layer is treated with the liquid composition according to Claims 32-35 and 37. In response (see paragraph bridging pages 5-6 of the Response to Arguments section), the current Office Action alleges that the component taught by Spence et al. is "clearly" in an "assembled state" "where such term is given its broadest reasonable interpretation." But the current Office still fails to specifically identify what "component" is being referred on in Spence et al., or what the Office Action believes the "broadest reasonable interpretation" of the term "component" is such that it corresponds to a "turbine component in an assembled state" according to Claims 32-35 and 37.

For at least the foregoing reasons, the method of Claims 17-25, 27-30, 32-35 and 37 is unobvious over Spence et al., even in view of Hasz et al..

B. Response to Rejection of Claims 26 and 37 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al., in View of Hasz et al., and Further in View of Ceramics and Glasses

At page 8 of the Office Action (see section 5), Claims 26 and 37 have again been rejected under 35 U.S.C. § 103(a) as unpatentable over Spence et al., in view of Hasz et al., and further in view of pages 11, and 752-53 from Volume 4 of the Engineered Materials Handbook (Ceramics and Glasses). Briefly, page 752 of Ceramics and Glasses discloses that: (1) a number of transitional alumina structures can form initially with increasing temperatures, but all structures are transformed irreversibly to alpha alumina with a conrundum structure of a hexagonal system; and (2) alpha alumina is the only stable form above 1200°C (2190°F).

Applicants respectfully traverse this rejection for at least the same reasons why Claims 17-25, 27-30, 32-35 and 37 are unobvious over Spence et al., in view of Hasz et al. In addition, Ceramics and Glasses does not teach or suggest that the alpha alumina formed would be finely divided, as defined in Claims 26 and 37. Indeed, the Office Action fails to even address *where* Ceramics and Glasses teaches or suggests that the alpha alumina formed would be finely divided.

In response (see page 6 of the Response to Arguments section), the Office Action again suggests that that thermally converted aluminum alkoxide to alpha alumina "must necessarily result in finely divided alpha alumina." This suggestion again improperly relies on what the above application teaches, and not what Ceramics and Glasses or any of the other art relied on teaches. Again, without any support in the art relied on, the Office Action again incorrectly and improperly suggests that either: (1) the above application and the art have different definitions for alpha alumina thermally converted from aluminum alkoxide; or (2) Claims 26 and 37 are using other processing steps or parameters that are not in these Claims. While the Examiner says that the previously requested affidavit/declaration under 37 CFR 1.104(d)(2) is "not necessary," Applicants must respectfully renew their previous request that he provide such an affidavit/declaration to support what appears to be a belief based on his own personal knowledge and not what is taught by the art relied on.

Moreover, because Spence et al. and Hasz et al. fail to teach or suggest infiltration of the alumina precursor within a porous outer layer of a thermal barrier coating, with subsequent conversion in situ to alumina, the combination of Ceramics and Glasses with these other two references still fails to teach or suggest the method defined in Claims 26 or 37.

For at least the foregoing reasons, the method of Claims 26 and 37 is unobvious over Spence et al., in view of Hasz et al., even when considered in view of Ceramics and Glasses.

C. Response to Rejection of Claims 32 and 38 under 35 U.S.C. § 103(a) as Unpatentable over Rigney et al. in view of Spence et al. and in View of Hasz et al.

At page 8 of the Office Action (see section 6), Claims 32 and 38 have again been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 6,274,193 (Rigney et al.), in view of Spence et al., and in view of Hasz et al. Briefly, Rigney et al. discloses a method for restoring a protective coating including a metallic environmental resistant coating, having a coating total thickness within a coating design thickness range, on a metal substrate of an article that has experienced service operation. See column 2, lines 17-21.

Applicants respectfully traverse this rejection for at least the same reasons why Claims 17-25, 27-30, 32-35 and 37 are unobvious over Spence et al., in view of Hasz et al. Applicants are again puzzled as to why Claim 32 has again been rejected under 35 U.S.C. § 103(a) as unpatentable over Rigney et al., in view of Spence et al., and in view of Hasz et al. Only Claim 38, not Claim 32, specifically defines step (1) as providing a refurbished thermal barrier coating that overlays the metal substrate of the turbine component.

In response (see paragraph bridging pages 6-7 of the Response to Arguments section), the Office Action alleges the following "motivation" for combining these references: (1) Rigney et al. allegedly teaches repairing a damaged turbine component by removal of the entire thermal barrier coating, repairing the metal component at the discrete location of the damage, and finally reapplying the thermal barrier coating to the outside of the refurbished turbine component; (2) one would allegedly be motivated to modify Rigney et al. to apply the protective coating to the thermal barrier coating of a refurbished turbine component, as allegedly suggested by Spence et al. in view of Hasz et al., to provide a desirable protection of the a thermal barrier coating for a turbine component because; (3) Spence et al. in view of Hasz et al. discloses that a protective

coating applied to a thermal barrier coating is allegedly "known in the art" to provide protection against contamination; and (4) therefore "would be reasonably expected to effectively provide a refurbished turbine component with [an] outer thermal barrier coating with protection against contaminants."

This alleged combination of references is *prima facie* improper because the Office Action has still not provided any proper motivation for combining Rigney et al. with Spence et al and Hasz et al. *See, e.g., In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so"); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

In particular, the Office Action has still alleged no proper basis for why one skilled in the art would be motivated to use alumina in the repair process of Rigney et al. based on what Rigney et al. would suggest. The motivation put forth by the Office Action for using alumina in the Rigney et al repair process is based on what Spence et al. and Hasz et al. allegedly desire for a protective coating for a component, and not what the primary reference, Rigney et al., would suggest to one skilled in the art would be a desirable material for repairing a damaged section of a coating.

In fact, Rigney et al. suggests a distinct preference for a different type of coating for its repair process, namely a diffusion aluminide coating or an overlay coating, neither of which is the same or similar to alumina. See column 3, lines 50-58 of Rigney et al. Why one skilled in the art would be motivated to select alumina over these other coating materials taught for use in the Rigney et al repair process for the purposes set forth by Rigney et al. is still never addressed by the Office Action.

For at least the foregoing reasons, the method of Claims 32 and 38 is unobvious over Rigney et al., even in view of Spence et al. and/or Hasz et al.

D. Conclusion

In conclusion, Claims 17-30 and 32-38, as amended or as currently presented, are unobvious over the prior art relied on in the Office Action. Accordingly, Applicants respectfully request that Claims 17-30 and 32-38, as amended or as currently presented, be allowed to issue in the above application.

Respectfully submitted,

For: John Fredrick ACKERMAN et al.

/Eric W. Guttag/

Eric W. Guttag
Attorney for Applicants
Reg. No. 28,853
Customer No. 49305

JAGTIANI + GUTTAG
Democracy Square Business Center
10363-A Democracy Lane
Fairfax, Virginia 22030
703-591-2664

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